Cryptocoryne sivadasanii (Araceae), a new species from India

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Abstract


Plants from Kerala and Karnataka, SW India, which have been identified hitherto as Cryptocoryne consobrina, are recognized as a distinct, unique new species. It is described as C. sivadasanii, illustrated and its relationship is discussed.

Introduction

The genus Cryptocoryne, with about 50 species, is distributed in tropical mainland Asia and the Malesian Archipelago (Mayo & al. 1997). In India five species have been recognized hitherto. The genus is characterized by a small spadix included in the basal tubular portion of the spathe, called a kettle. The female flowers are few in number and arranged in a single whorl, forming a syncarp. The male flowers have two horn-like tubular projections at the top of the anther.

During the course of the revisionary study of the Araceae of India in general and a detailed taxonomic survey of the genus Cryptocoryne of S India in particular, some specimens were collected from the Kerala and Karnataka states, which have been referred to C. consobrina Schott (Sivadasan 1985, Jacobsen & al. 1989). Observed differences from typical C. consobrina were thought to be due to environmental factors. Later Bhat (2003) identified the plants from Karnataka as C. crispatula Engl., of which they differ, however, in several characters. The dispute about the taxonomy of the S Indian plants prompted their detailed study, which finally revealed that the plants in question represent a new species so that India now has six species of Cryptocoryne.

Cryptocoryne sivadasanii Bogner, sp. nova

Holotypus: India, Kerala, Malappuram Distr., stream-bed in Vallamthodu (south of the Calicut University Campus), 2.2.2004, Sivadasan & Kiran Raj CU 21595 (CAL; isotypi: K, M, MH) – Fig. 1-3.

Differt a Cryptocoryne consobrina laminis foliorum angustissimis linearibus, 40-130 cm longis et 0.3-0.6 cm latis (in C. consobrina 1.5-2.5 cm latis), lamina spathae torta et recurva cum collo, stigmati sessili, corpusculis odoriferibus obconicoideis supra applanatis, seminibus plusminusve ellipsoideis, testa plusminusve laevi vel leviter punctata.
Fig. 1. *Cryptocoryne sivadasanii* – A: habit of submerged plant with long slender leaves; B: habit of emerged plant with reduced leaves and inflorescences; C: inflorescence; D: limb of spathe showing collar; E: kettle of the inflorescence with spathe partly removed showing the spadix and the alveolae in the upper part of the kettle; F: female flowers; G: longitudinal section of syncarp with olfactory bodies (ob) surrounding the base of the sterile interstice; H: cross section of syncarpium; I: male portion of the spadix with appendix; J: single male flower; K: infructescence; L: seed.
Rhizomatous perennials, rhizome 3-8 cm long and 0.4-0.7 cm in diam., up to 8 cm deep in the soil, often with transverse nodal ridges; roots of first order 2-3 mm in diam., second order roots thinner, 0.2-0.6 mm in diam. Leaves several, the submerged ones very long, the emerged ones short without normal blades; petiole 10-32 cm long and 0.12-0.2 cm in diam., sheath 3-10 cm long, lower part (below soil) white, upper part green; leaf blade (30-)40-130 cm long and (0.3-)0.4-0.6 cm wide, linear, tip apiculate, margin entire, sometimes (when not fully submerged) undulate to wavy, olive to purplish green, without clear demarcation between blade and petiole; midrib light green, not very pronounced, lateral veins inconspicuous, 2-3 on each side of the midrib. Peduncle 0.5-2(-4) cm long and 0.25-0.35 cm in diam. Spathe (4-)7-14.5 cm long; kettle 1.5-2.8 cm long and 0.6-0.8 cm in diam., somewhat constricted below the male portion, white at base and purplish above inside, with small depressed translucent pits (alveolae) around the male portion; tube between kettle and limb (1.5-)2.8-6 cm long and (0.3-)0.4-0.6 cm in diam., with purplish spots inside; limb (1.5-)2.5-4.5 cm long and 0.8-1 cm broad at base, ovate, acuminate, tip spirally twisted and recurved, warty inside, its colour varying from yellowish green to purplish, reddish brown, bluish green or cream, mostly with purple spots; collar present at base of the limb, warts present on the limb above the collar (collar not discernible when dry). Spadix 15-28 mm long, the basal female portion 4-5 mm long, the naked slender interstice (axis of spadix) 5-10 mm long, the male portion ellipsoid to globular, 2-4 mm long and 2-2.2 mm in diam., with (40-)54-80 male flowers, the terminal, short elongate-conoid appendix 1.25-1.5 mm long. Flap elliptic, c. 3 mm long and 2 mm wide, whitish. Male flowers consisting of one stamen only, c. 0.5 mm long and 0.3-0.4 mm wide (viewed from above), with a conspicuous rim at the top and two bilocular thecae, each with a tubular horn, opening apically by a small pore. Female flowers 3-4(-6), c. 4 mm high, connate in a whorl; stigma sessile, 0.6-0.8 mm in diam., round, with slight depression in the centre, covered.
Fig. 3. *Cryptocoryne sivadasanii* – A: habit of submerged plants in a stream; B: single submerged plant taken out; C: dry stream bed with inflorescences and reduced leaves; D: plant with inflorescence and two young infructescences; E: inflorescences showing variation in size and form of the spathe limb; F: portion of the inner wall of the upper spathe tube showing purple spots; G: spadix; H: infructescences (not fully mature).
with short papillae; each ovary with 10-14 ovules; olfactory bodies usually 4, rarely to 6, obconoid with a rough and flat top, each 0.3-0.4 mm long and 0.5-0.75 mm in diam., situated just above the female flowers and alternating with the stigmas. Infructescence ovoid, 10-18 mm long and 9-12 mm in diam. Seeds 5-8 per ovary, more or less ellipsoid, somewhat irregularly angled by pressure of the neighbouring seeds, 3.5-4 mm long and 1.5-1.75 mm wide, brownish; testa more or less smooth or finely punctate, not ribbed; embryo elongate, 1.5-2 mm long and 0.3-0.4 mm in diam.; endosperm copious, white, c. 0.4 mm thick.

Chromosome number. – 2n = 36, counts based on Bogner 1846 (pers. comm. G. Petersen, Copenhagen).

Distribution. – Endemic to Kerala and southwestern Karnataka. Only few localities are known, some near the Calicut University Campus in Malappuram District, Kerala State, and one in Padubidri between Mangalore and Udupi in the southern Kanara District, Karnataka State.

Further specimens examined. – KERALA State: Malappuram Dist., Thenjhipalam, Vallamthodu on the southern side of the Calicut University Campus, 23.10.1976, Sivadasan CU 19160 (vegetative with leaves only) (CALI); ibid., 14.3.1981, Sivadasan CU 21479 (with inflorescence) (CALI); ibid., 14.3.1981, Sivadasan CU 21480 (with inflorescence) (CALI); ibid., 25.11.1986, Bogner 1846 (B, K, M, US) [with leaves and only with buds of inflorescences]; Malappuram Distr., small stream 1 km south of Calicut University Campus, alt. c. 45 m, 22.12.1993, C. D. K. Cook & M. Camenisch 5224 (Z); Malappuram Distr., small roadside stream, c. 6 km south of Calicut University Campus, alt. c. 20 m, 20.11.1993, C. D. K. Cook & M. Camenisch 5222 (Z); Kozhikode Distr., Ramanattukara, near the junction of the National Highway-17 by-pass and the road to Konotty, near sea level, small stream with granite block walls and gravel or laterite base, 31.12.1993, C. D. K. Cook & M. Camenisch 3321 (Z). – KARNATAKA State: S Kanara Distr., Padubidri (between Mangalore and Udupi), 30.1.2004, Sivadasan CU 21594 (CALI).

Pollination. – Very small black flies (c. 0.9 mm long and c. 0.5 mm diam.) of the family Sphaeroceridae were observed as the pollinators of Cryptocoryne sivadasanii. The flies were captured in the kettles.

Ecology. – Cryptocoryne sivadasanii grows in lateritic soil with gravel in the running water of stream beds. The water at the type locality has a pH of 5-5.4. At Padubidri in Karnataka it grows in a sandy bed with gravel and in the Kozhikode District also in the crevices of granite blocks in the lateritic stream bed. Inflorescences are produced during the dry season only, when the water recedes and the stream bed runs dry. Flowering of the plants has been observed from December until March. Commonly associated species in the Calicut area are Blyxa aubertii Rich. and Schoenoplectus articulatus (L.) Palla.

Eponymy. – Cryptocoryne sivadasanii is named in honour of Prof. Dr M. Sivadasan from the Calicut University, Kerala, who discovered the species several years ago and made many valuable observations in the natural populations.

Propagation. – The propagation of the plants in normal mode is by seeds. Besides, in Cryptocoryne sivadasanii a peculiar mode of vegetative propagation has been observed and the details were described by Jacobsen & al. (1989) under C. consobrina. The root-associated accessory buds (Fig. 2B, C) are the propagules in this peculiar mode. When the roots become detached from the rhizome by mechanical means, the root-associated accessory bud located at the junction of the root with the rhizome will also get detached. If these roots along with the accessory buds become dispersed to new locations with favourable conditions, the buds start growing and may get established as a new plant.

Usually Cryptocoryne species have vegetative propagation by subterranean stolons. But in C. sivadasanii stolons are only rarely seen. Another unusual vegetative propagation has been noted in C. elliptica Hook. f. from Malay Peninsula where buds are present at the base of easily breaking off leaf petioles, but this species is not related to the new species described here (Jacobsen & al. 1989).
Relationship. – Cryptocoryne sivadasanii is related to C. retrospiralis (Roxb.) Fisch. ex Wydler and C. consobrina. These three species, plus C. crispatula Engl., C. albida R. N. Parker and probably C. cruddasiana Prain belong to one group. C. retrospiralis has a wide distribution in India and C. crispatula from Thailand, Laos and Vietnam to S China; C. albida is known from Thailand and Myanmar (Burma), while C. cruddasiana only from N Myanmar.

Cryptocoryne sivadasanii has previously been referred to C. consobrina based on the similarities in inflorescence characters. The latter species, however, differs in several characters. The flowers of C. consobrina appear contemporarily with the leaves, and the leaves are dimorphic, with linear-lanceolate, 16-20 cm long emerged leaf blades and up to 40 cm long submerged ones (Fischer 1936, Wit 1983, 1990). With the onset of the monsoon after the streams are flooded, in C. sivadasanii leaves appear that are linear and reach a length of c. 160 cm with blades up to 130 cm long. The inflorescences appear when the stream beds run dry during the summer and the leaves have been wilted. Contemporarily with the inflorescence then leaves develop that are rather inconspicuous, short, thick, bladeless, terete, with pointed tips and basal sheaths, and are best interpreted as cataphylls.

Among the above mentioned species, Cryptocoryne sivadasanii is the only one in which the flowering is not contemporary with the (normal) leaves and which has a dormant stage in the dry season after flowering. The others are, as usual in Cryptocoryne, evergreen. Only C. nevillii Hook.f. from Sri Lanka (Ceylon), which is not among the related species, also has a dormant stage, but it flowers at the beginning of the rainy season before the leaves appear or contemporarily with the first leaves.

Cryptocoryne sivadasanii has a distinct collar at the base of the spathe limb as is also the case in C. consobrina, and in both species the limb is warty on the surface. In C. retrospiralis the spathe is without a collar and the limb is smooth and spirally twisted many times, whereas only twisted once or twice and recurved in C. sivadasanii. Furthermore, the kettle is thickened just below the male portion and alveolar at the upper portion in C. sivadasanii and C. retrospiralis, but not thickened and not alveolar in C. consobrina. The stigma is completely sessile in C. sivadasanii, but subsessile with a very short, bent style in C. consobrina; a style is clearly present in C. retrospiralis. C. consobrina has multi-ovuled ovaries, C. sivadasanii 10-14 ovuled ovaries. It also seems that C. sivadasanii has fewer male flowers than the other two species mentioned above, but the number of male flowers is often variable. C. sivadasanii has the narrowest (not more than 6 mm wide) and longest leaf blades; C. consobrina and C. retrospiralis have broader and comparatively shorter leaf blades. Furthermore, C. retrospiralis produces reduced, terete leaves where the blade consists of the middle vein only at a certain period; this was also observed in certain C. crispatula varieties. In C. cruddasiana the spathe limb is also warty, the kettle is alveolar in its upper inner part and the leaf blade is linear (0.5-1 cm wide), but the olfactory bodies are irregularly lobed.

Cryptocoryne sivadasanii, C. retrospiralis, C. crispatula and C. albida all have a chromosome number of 2n = 36. In addition, from C. retrospiralis tetraploid plants with 2n = 72 chromosomes, and from C. crispatula triploid plants with 2n = 54 are also known. The chromosome numbers may support a close relationship of these species. However, other, very different and not related species from Sri Lanka (e.g. C. thwaitesii Schott) and Sarawak (e.g. C. lingua Engl.) also have a chromosome number of 2n = 36 (Arends & al. 1982). The chromosome numbers of C. consobrina and C. cruddasiana are unknown; they have never been in cultivation and therefore were never counted.

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References

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